MANY men of science in this country will learn with great regret that PROF. H. A. BUMSTEAD, professor of physics at Yale University, and president of the National Research Council of the United States, died suddenly at Washington on January 1. Prof. Bumstead was for some time in London during the war, and was the head of the American organisation for keeping touch between the two countries in matters concerning the application of science to war.

Notes.

WE publish in our correspondence columns this week a translation of a letter from Prof. F. M. Exner, director of the Central Meteorological and Geodynamic Institute at Vienna, and Prof. J. Hann, the former director, appealing for financial aid to enable the institute to carry on the valuable work it has done for meteorology for the past seventy years, and to continue its publications. Already, both in Great Britain and in the United States, funds have been provided for meeting the personal needs of meteorologists in Vienna who were without the necessaries of life, but meteorologists are not, as a rule, wealthy men, and they cannot do much more than they have done. Other scientific workers have probably approached much the same limit of their capacity to help. While, therefore, we commend the appeal to our readers, we think it would be difficult for private benefactors to provide the means for carrying on the work of the institute. A much more promising course to urge is that some part of the credits made to Austria by England and France should be ear-marked for the maintenance of essential scientific services. We suggest that the Royal Society or the Royal Meteorological Society should take steps with the object of securing support of this kind for the Meteorological Institute at Vienna.

MR. C. E. FAGAN is expected to retire from the British Museum (Natural History) in the spring of this year. He entered the service of the Trustees in 1873, and became assistant secretary in 1889. He received the title of secretary in 1919, in recognition of the conspicuous value of his services. It is safe to say that Mr. Fagan has done more than any other living man in developing the importance of the museum as a centre of scientific activity. His long experience, his grasp of affairs, and his unfailing capacity for forming a correct judgment have made his co-operation and advice invaluable to the Trustees and to his colleagues. His administrative ability has been of the greatest service to successive directors, whom he has assisted in innumerable ways, while during more than one period of interregnum he has succeeded in maintaining the efficiency of the museum at a high level. Although not himself an investigator, Mr. Fagan has taken a keen interest in many aspects of natural history, and has been quick to appreciate the importance of an opening, whether the chance of securing a valuable collection or the opportunity of encouraging an expedition to some distant country. He has been closely associated with such societies as the British Ornithologists' Union and the Royal Geographical Society, the interests of which are connected with those of the Natural History Museum. Opportunities of making the museum practically useful have a special appeal for him, and he has taken great interest in exhibits of economic importance. From the first he has been a strong supporter of the close connection which happily exists between the museum and the Imperial Bureau of Entomology. Mr. Fagan has rendered exceptional services to science by single-minded devotion to his ideal of increasing and developing the scientific importance of the museum. The fact that he is suffering from a severe illness at the time which he had hoped to devote to putting the finishing touches to his long period of successful service will command the ready sympathy of his many friends.

WE hope that the Victor Horsley Memorial Fund will be well supported. The *Times* publishes a strong appeal for it, signed by the president of the Royal College of Surgeons, the professor of physiology in the University of Edinburgh, and others. "If only each patient whose life he saved," they say, "were to contribute to our fund according to their means, we should have all the money that we require, and more." Contributions may be sent to Sir Frederick Mott, 25 Nottingham Place, W.1, or to Dr. Howard Tooth, 34 Harley Street, W.1. The plan is for a scholarship or a lectureship. We all remember the coming of the news of Horsley's death from heat-stroke in Mesopotamia in July, 1916. Some of us, more fortunate, also remember the wonder of his threefold work in 1884–90: his advancement of the physiology and surgery of the central nervous system, his studies of the thyroid gland and of myxœdema, and his uphill fight, as Pasteur's representative, for the stamping-out of rabies. After 1890 Horsley was for a quarter of a century incessantly teaching, incessantly learning. Alike in hospital practice and in private practice, he set himself to Guy de Chauliac's ideal of a surgeon: "Bold when sure, cautious in danger, kind to the sick, friendly with fellow-workers, constant in duty, not greedy of gain." Moreover, he worked hard, no man harder, for the betterment of his profession, for its greater efficiency in the all-round service of national health, and for the protection of its poorer members against exploitation and the insolence of office. Later he was in the forefront of the fight against drink, the fight for the welfare of children, and the fight for votes for women. He was ever a fighter, and he offended by his vehemence, his intolerance. But those who were altogether opposed to him in politics are none the less thankful for his magnificent work in physiology and surgery; it went over all the civilised world, and we are bound in honour to commemorate his name.

WE refer elsewhere to the annual meeting of the Mathematical Association and the presidential address by Canon J. M. Wilson. The assistance given by

NATURE to the movement for the improvement of geometrical teaching referred to in the address is not without interest to our readers. Prof. Hirst (in his lectures at University College, London, and elsewhere) and a young master at Rugby, the present Canon Wilson (in a paper read before the London Mathematical Society, printed in the *Educational Times* for September, 1868), were among the first to raise the note of dissatisfaction. Mr. R. Tucker, of University College School, was the first to broach the subject in our columns (NATURE, March 24, 1870, vol. i., p. 534), while the next effective contribution was from Mr. Rawdon Levett, of King Edward's School, Birmingham, who (May 26, 1870, vol. ii., p. 64) raised the fiery cross and called for an Anti-Euclid Society. Mr. Wormell then suggested that contributions to the expenses of propaganda should be sent to Mr. Levett. The result was the notice of a forthcoming conference (NATURE, December 29, 1870, vol. iii., p. 169). At the first meeting Messrs. Hirst and Wilson secured the substitution of "improvement" for "reform" in the title of the New Association for the Improvement of Geometrical Teaching, and it was Canon Wilson who suggested that the association would best justify its existence by preparing a syllabus. At the meeting of 1872 he proposed the appointment of a sub-committee to draw up a detailed syllabus of geometry to be submitted to the highest mathematical authorities and examining bodies. The next year he moved that the adopted syllabus should be sent to the British Association for its comments. In 1874 he moved that the five schemes of proportion mentioned in the report of the committee be examined by all the members and their opinions be invited. After that year his attendance became less regular, but it will be seen that he took the foremost place in the actual work of getting out the syllabus. It must be a source of satisfaction to Canon Wilson to find the bantling at the birth of which he was present fifty years ago now in its turn the parent of branches in these islands and the Colonies, and, *post tot annos,* sending forth once more through his lips its message of achievement. Of the venerable canon, who is now eighty-five, it may almost be said that his eye is not dim nor his natural force abated.

THE KING has signified his intention of conferring the honour of knighthood on Dr. Maurice Craig, Consulting Neurologist to the Ministry of Pensions, and Dr. P. Horton-Smith Hartley, senior physician at the Hospital for Consumption and Diseases of the Chest, Brompton.

PROF. E. W. SCRIPTURE, who contributes to this issue the first of two articles on "The Nature of Vowel Sounds," was formerly professor of experimental psychology in Yale University, but is now resident in London, where he has been for some years engaged on studying records of speech in epilepsy, general paralysis, and other nervous diseases. Prof. Scripture has lately returned from Germany, where he has been lecturing on experimental phonetics applied to the study of English. These were the first lectures delivered in Germany since the war by a professor from a former enemy country.

ON Tuesday next, January 18, at 3 o'clock, Sir G. P. Lenox-Conyngham will give the first of two lectures at the Royal Institution on "The Progress of Geodesy in India"; and on Thursday, January 20, Dr. Arthur Harden will begin a course of two lectures on biochemistry (vitamines). The Friday evening discourse on January 28 will be delivered by Sir James Dewar on "Cloudland Studies."

THE council of the Geological Society has this year made the following awards:—Wollaston medal (in duplicate), Dr. John Horne and Dr. B. N. Peach; Murchison medal, Mr. E. S. Cobbold; Lyell medal, Dr. E. de Margerie, director of the Geological Survey of Alsace-Lorraine; Bigsby medal, Dr. L. L. Fermor, Geological Survey of India; Wollaston fund, Dr. T. O. Bosworth; Murchison fund, Dr. Albert Gilligan; and Lyell fund, Prof. H. L. Hawkins, Reading University College, and Mr. C. E. N. Bromehead, H.M. Geological Survey.

THE annual meeting of the Iron and Steel Institute will be held on Thursday and Friday, May 5 and 6, at the Institution of Civil Engineers, Great George Street, London, S.W.1. Dr. J. E. Stead, president, will preside. In March the council will be prepared to consider applications for grants from the Carnegie Fund in aid of research work of such value as may appear expedient, but usually of the value of 100*l.* in any one year. The awards are made irrespective of sex or nationality. Special forms, on which candidates should apply before the end of February, can be obtained from the secretary of the institute. The research work must be on some subject of practical importance relating to the metallurgy of iron and steel and allied subjects. The results of research work must be communicated to the institute in the form of a report.

AT a general meeting of the Royal Meteorological Society to be held in the rooms of the Royal Astronomical Society, Burlington House, at 8 p.m., on January 19, a proposal will be brought forward for the incorporation of the Scottish Meteorological Society with the Royal Meteorological Society. The Scottish society has done useful work in the advancement of meteorology, particularly the meteorology of North Britain, since its foundation in 1855. It was closely connected with the work of the high-level observatory maintained on the summit of Ben Nevis for many years. It is felt that the time has now come when a fusion of the two bodies which represent the science north and south of the Border will be to the interest of meteorology as a whole and advantageous to the fellows of both societies. At 8.30 p.m., after the termination of the business meeting, Mr. R. H. Hooker, president of the Royal Meteorological Society, will deliver an address on "Forecasting the Crops from the Weather." Any workers interested in this subject from either the meteorological or the agricultural side are invited to the lecture.

THE Board of Trade has appointed Sir R. T. Glazebrook to be Chief Gas Examiner under the Gas Regulation Act, 1920, and Mr. C. V. Boys, Dr. J. S. Haldane, and Mr. W. J. A. Butterfield to be Gas

Referees. The Board has also appointed Mr. H. C. Honey to be Director of Gas Administration in the Power Transport and Economic Department, Board of Trade Offices, Great George Street, S.W.1. In pursuance of the provisions of section 2 (4) of the Act, the Board has appointed Sir William Pearce (chairman), Dr. T. Carnwath, Mr. W. D. Gibb, and Dr. T. Gray to be a Committee to inquire whether it is necessary or desirable to prescribe any limitation of the proportion of carbon monoxide which may be supplied in gas used for domestic purposes. It has also appointed Mr. J. H. Gray (chairman), Mr. W. J. A. Butterfield, and Dr. C. H. Lander to be a Committee to inquire whether it is necessary or desirable to prescribe any limitations of the proportions of incombustible constituents which may be supplied in gas. Communications should be addressed to the Secretary to each of these Committees at the Power Transport and Economic Department, Board of Trade, Great George Street, S.W.1.

THE Air Ministry announces that the Cabinet has approved, subject to Parliamentary sanction, the grant of a sum for the direct assistance of civil aviation. During the financial year 1921–22 payments under this grant will be limited to a maximum sum of 60,000*l.*, and will be made to British companies operating on approved aerial routes. The routes at present approved are London to Paris, London to Brussels, and London to Amsterdam. Extensions to these routes and additional routes, such as England–Scandinavia, on which the possibilities of a service employing flying boats or amphibian machines or a mixed service of sea and land aircraft can be demonstrated, may be approved from time to time if satisfactory proposals are received by the Air Council. The maximum time allowed for journeys between London and Paris, between London and Brussels, and between London and Amsterdam will be four hours from aerodrome to aerodrome (or such other time limit as may be determined later by the Air Council). Any British company intending to run on the routes and notifying the Air Council of this intention will become an "approved" organisation by fulfilling the conditions laid down. Such notification should be addressed to the Secretary (C.G.C.A.), Air Ministry, Kingsway, W.C.2, to whom requests for further particulars in respect of the grant should be addressed.

THE KING, on the recommendation of the Home Secretary, has approved the appointment of a Royal Commission to inquire into the existing provision for: (1) The avoidance of loss from fire, including the regulations dealing with the construction of buildings, dangerous processes, and fire risks generally, the arrangements for inquiry and research and for furnishing information and advice to public authorities and others on matters relating to fire prevention; and (2) the extinction of outbreaks of fire, including the control, maintenance, organisation, equipment, and training of fire brigades in Great Britain; and to report whether any, and if so what, changes are necessary, whether by statutory provision or otherwise, in order to secure the best possible protection of life and property against risks from fire, due regard being paid to considerations of economy as well as of efficiency. The Commission will be composed as follows:—The Hon. Sir Perceval M. Laurence (chairman), Mr. J. T. Burns, Sir Vincent H. P. Caillard, Mr. A. L. Dixon, Sir Maurice Fitzmaurice, Capt. V. L. Henderson, Sir Joseph E. Petavel, Mr. H. Peters, Lt.-Comdr. Sir Sampson Sladen, Mr. H. Stilgoe, and Lt.-Col. G. Symonds. In addition, there will be representatives of the County Councils' Association, of the Association of Municipal Corporations, and of the Fire Offices' Committee. The names of these representatives will be announced later. The secretary is Mr. J. C. MacIver, of the Home Office. Any communications on the subject should be addressed to him at 5 Old Palace Yard, S.W.1.

UNTIL its work is completed and the materials are collected, published, and exhibited, it is somewhat premature to forecast the results of the Mackie Expedition to Central Africa under the conduct of the Rev. John Roscoe. It is clear from letters received that much success has been achieved among the Bunyoro tribe, which occupies the country to the east of Lake Albert in the Uganda Protectorate. This information has been summarised in an important paper by Sir J. G. Frazer, published in the December issue of *Man*.

MR. W. W. ROUSE BALL has reprinted through Messrs. Heffer and Sons, Cambridge, the interesting lecture which he delivered last spring at the Royal Institution on string figures, which we noticed at the time in these columns. He has added full directions for the construction of several easy typical designs, arranged roughly in order of difficulty, and, for those who wish to go further, lists of additional patterns and references. This fascinating art can be practised with the simple aid of a piece of good string some 7 ft. long.

THE Welsh Department of the Board of Education has issued, under the title of "Scheme for the Collection of Rural Lore in Wales," a pamphlet containing a series of rules and suggestions for secondary schools and colleges. The scheme has been financed by members of the Honourable Society of Cymmrodorion with the object of preparing a kind of Welsh Domesday Book, the material of which is to be collected by teachers and pupils. One part of the scheme is the collection of all Welsh place-names from the ordinary Survey maps and other sources. Rural industries, survivals of old or curious customs and crafts, peculiar words, local proverbs, primitive agricultural implements, marks on sheep or ponies, notice of places where old pottery and the like have been discovered—in fact, all kinds of information on rural and industrial life are solicited. The scheme is well conceived and the instructions are helpful. Educational authorities in other parts of these islands may well consider how far the Welsh scheme can be adapted to local conditions.

THE Gem Dry Plate Co., Cricklewood, N.W., has forwarded to us a pamphlet on photomicrography. A simple account is given of the process, which includes a description of apparatus, illumination, focussing, exposure, the use of light-filters, printing, and development. The pamphlet is illustrated with eight excellent plates showing reproductions of photomicrographs of diatoms, foraminifera, sections of animal and plant tissues, anthers and pollen, etc.

IN *Archives of Radiology and Electrotherapy* for November last (No. 244) Mr. H. A. Colwell continues his sketch of the history of electrotherapy. An account is given of the introduction and use of the galvano-cautery, electrolysis, and influence machines, with illustrations of the first apparatus employed. It is interesting to see that an "electrical room" was started at Guy's Hospital in 1836, and various forms of electrical treatment were investigated by Addison, Golding-Bird, and Gull among others.

THE Tidal Investigations and Results of the Canadian Arctic Expedition, 1913–18, are issued as vol. x., part C, of the report of that expedition. Dr. W. B. Dawson notes that observations were made for varying lengths of time at ten stations on the south and east of the Beaufort Sea. The low temperatures and the consequent hardening of the oil in the clockwork of the registering tide-gauges presented a difficulty, which, however, was largely overcome by installing the instruments in snow-houses. The temperature of snow-houses can be kept at 40° to 50° F. by the use of lamps without the walls thawing. The range of the tide on the open shores was usually less than 1 ft., and seldom as much as 1½ ft. At the head of Amundsen Gulf it occasionally exceeded 2 ft. This small range is too slight to have any direct effect on navigation, but sufficient to move grounded ice. From the few data available it appears that the tide enters the Beaufort Sea from the north and moves southward and westward. Dr. Dawson recommends the establishment of some permanent tidal station for reference, and suggests the suitability of Herschel Island, which is one of the few localities in the region with a settled white population.

THE relation of surface visibility of the atmosphere to suspended impurity is dealt with in the *Meteorological Magazine* for December by Dr. J. S. Owens. In commenting on the difficulty of dealing with the whole subject of visibility experimentally, and especially with reference to the visibility of lights, allusion is made to the scattering of light by the small suspended particles in the air. Allusion is also made to the important part that the perception of colour plays in visibility, and it is stated that the sensitiveness of the eye for blue-greens is greater than for reds when the light is fading. Mr. N. K. Johnson contributes a communication on the visibility of pilot-balloons. He gives the results of an attempt made at Shoeburyness to determine which colour is most suitable for pilot-balloons, and especially for long-distance work. When the sun is shining on a balloon its visibility depends on its reflective power; without the sunshine you have to depend on the opacity of the balloon. The results are summarised as follows:—(1) Against a background of continuous dense white cloud either red or blue should be used. (2) If the sky contains slight cirrus or haze red is the correct colour to employ. (3) On occasions on which the sky is cloudless and of a deep blue colour a white balloon should be selected. The magazine shows that the total rainfall in November varied greatly in different parts of the British Isles. The general amounts were:—For England and Wales, 49 per cent. of the average; Scotland, 106 per cent.; and Ireland, 110 per cent.

WE have received from the firm of Messrs. Adam Hilger, Ltd., pamphlets describing their most recent spectrographs. Instruments with quartz prisms and lenses can be supplied ready for photographs to be taken to give the whole spectrum from 210 $\mu\mu$ to 800 $\mu\mu$. In some cases an accurate scale of wavelengths is mounted internally so that a contact print of the scale can be obtained on the same plate as the photograph of the spectrum. Concave-grating spectrographs with the mounting designed by Mr. A. Eagle are recommended, as this form is found to possess many advantages in comparison with the classical Rowland mounting. The apparatus occupies very little space and possesses great rigidity. For the investigation of the Schumann and Lyman regions of the spectrum, which may yield most important theoretical results, the same type of mounting is used in a vacuum spectrograph. By the use of two slits the whole spectrum from 210 $\mu\mu$ to 50 $\mu\mu$ may be obtained with one setting of the grating. This is the instrument which has been employed by Prof. McLennan and his fellow-workers. Messrs. Hilger also construct an X-ray spectrometer as designed for Sir W. H. Bragg on the principle of Dershem.

THE problem of the high-frequency resistance and inductance of parallel wires is one that has been studied very carefully by many physicists, including Maxwell, Kelvin, Rayleigh, and Heaviside. The problem, however, which they considered was the symmetrical case of a cylindrical conductor when the return current was so far away that its magnetic effects on the distribution of the current in the cylinder could be neglected. A notable advance in the theory has recently been made by Mr. Harvey L. Curtis in a paper published by the Bureau of Standards, Washington (No. 374). Mr. Curtis has developed a new mathematical method by means of which he easily obtains the ordinary solutions applicable to a concentric main, and, in addition, obtains solutions for two parallel cylindrical mains at given distances apart. His solutions have been verified experimentally by the Bureau of Standards. It was found, for instance, that when an alternating current of 3000 frequency was sent through a circuit consisting of two parallel wires 0·651 cm. in diameter and 0·039 cm. apart the ratio of the alternating-current resistance to the direct-current resistance was 2·4. If the ordinary formulæ had been applied the ratio would have only been about 1·5. Similarly, it is shown both by theory and by the experimental results obtained that the irregular distribution of the current over the cross-section of the wire due to the proximity of the high-frequency return current very appreciably diminishes the coefficient of self-induction of the circuit.

THE "Index Medicus: A Classified Record of the Current Medical Literature of the World" (Washington: Carnegie Institution of Washington), which has hitherto been a monthly publication, will in future be issued at quarterly intervals. It will give the full titles of books, pamphlets, theses, original articles in journals, and transactions of medical and scientific societies. In the case of contributions printed in the lesser-known languages, their titles will be rendered into English. Each number will contain a general table of contents, and as soon as possible after the completion of each volume an "Annual Index of Authors" will be issued. Subscriptions to the work should be sent direct to the Carnegie Institution of Washington, Washington, D.C., U.S.A.

A useful catalogue (No. 86) of second-hand books and journals relating to zoological subjects has just been received from Messrs. Dulau and Co., Ltd., 34 Margaret Street, W.1. It contains upwards of 1100 titles. Among the works listed we notice a first edition of "The Origin of Species," "The British Museum Catalogue of Birds" (27 vols.), Dresser's "A History of the Birds of Europe," and Reeve and Sowerby's "Conchologia Iconica"; also complete sets of the *Zoologist* and the *Entomologists' Record and Journal of Variation.* Copies of the catalogue can be obtained from the publishers.

The latest catalogue (No. 361) of secondhand books and periodicals issued by Messrs. Bernard Quaritch, Ltd., 11 Grafton Street, W.1, is mainly of a general character, but lengthy sections devoted to botany, natural history, and Oriental literature make it worthy of the attention of readers of a scientific journal such as Nature. As is usual with catalogues circulated by Messrs. Quaritch, many rare volumes are offered for sale.

Our Astronomical Column.

Skjellerup's Comet.—It appears that this comet was first detected by Mr. C. J. Taylor at the Cape on December 8, Mr. Skjellerup finding it independently on December 11. It should, therefore, be called "Taylor-Skjellerup." Mr. R. L. Waterfield observed the comet at Hereford with a 4-in. refractor. His positions are not micrometrical, but eye-estimations from adjacent B.D. stars.:

	G.M.T.	R.A. 1920·0	N. Decl. 1920·0
	d. h. m.	h. m. s.	° ′
Dec.	31 12 0	10 16 38	16 22
Jan.	4 13 40	10 30 41	21 26

These agree within some 5′ with Mr. Wood's ephemeris, which is continued below (for Greenwich midnight):

		R.A.	N. Decl.	Log r	Log Δ
		h. m. s.	° ′		
Jan.	16	11 0 41	33 24	0·1093	9·5783
	20	11 7 17	36 22	0·1192	9·6095
	24	11 12 3	38 51	0·1293	9·6406
	28	11 15 11	40 56	0·1398	9·6715
Feb.	1	11 16 48	42 40	0·1506	9·7024
	5	11 17 28	44 3	0·1615	9·7328
	9	11 16 54	45 9	0·1726	9·7626
	13	11 15 52	45 55	0·1837	9·7920
	17	11 14 16	46 28	0·1948	9·8210
	21	11 11 10	46 53	0·2055	9·8486

History of the Chronometer.—Lt.-Comdr. R. T. Gould read a paper on this subject at the meeting of the Royal Geographical Society on December 13 which presents very vividly the tremendous revolution in navigation which this invention implied. He recalls Anson's disastrous voyage in 1741, when a mistake in the longitude caused such delay in making port that half the crew died of scurvy. After describing earlier abortive attempts, he proceeds to the famous prize of 20,000*l.* offered by the British Government in 1713, and won fifty years later by John Harrison, though he had undeniably earned the reward long before—a delay which reflected great discredit on the Government. The paper dwells on the inventive genius and constructive skill which Harrison continued to display; indeed, the performance of his various machines would be creditable at the present day. It is pointed out that his invention of the maintaining spring has never been superseded, and that the "remontoir" device for equalising the force on the escape-wheel, though no longer required on chronometers, has been introduced into the Riefler clock. Several anecdotes are given of Harrison's voyages, in which he frequently corrected the reckoning of the captain and officers; on one occasion he saved the ship from missing the Island of Madeira, to the great relief of the crew, who were short of beer.

Capt. Cook used a duplicate of Harrison's watch made by Kendall, and noted that "our longitudes can never be erroneous while we have so good a guide." The paper goes on to describe the work of Mudge, Le Roy, Berthoud, Arnold, and Earnshaw, and concludes by referring to the recent introduction of wireless telegraphy for time-distribution and direction-finding. The latter have effected a revolution in navigation almost as far-reaching as the invention of the chronometer.

The Planetesimal Hypothesis.—This hypothesis, enunciated by Profs. Moulton and Chamberlin, has been favourably received by a number of writers, including Dr. Jeans in his recent work on cosmogony. The *Scientific Monthly* for last May contains an interesting *critique* on the theory by Prof. Reginald A. Daly, of Harvard University. Prof. Daly suggests some amendments to Chamberlin's views on the later stages in the earth's development. Chamberlin concluded that the earth's temperature was never very high, that its mass has slowly increased through the impact of planetesimal dust, and that oceans existed when it had only one-third of its present mass. Prof. Daly argues (1) that the matter composing the different planets is likely to be the same in the main, and (2) that the low density of the giant planets, combined with the phenomena observed on their surfaces, gives conclusive evidence of high temperature. He thinks that the earth was molten, if not gaseous, during its early history. An argument is also drawn from the moon; ascribing the numerous pits either to the fall of planetesimals or to volcanic action, there could scarcely fail to be considerable traces of similar formations on the earth unless the surface had been more or less molten. The remaining arguments are geological rather than astronomical, but one may be mentioned. The amount of salt in the ocean has led to an estimate of about 100,000,000 years for the period during which rivers have been flowing into it. This time-estimate would be much too small if we accepted Chamberlin's view of the early stage in the earth's history at which the oceans appeared.